Juan Cuadros · Ana Mazón · Rocío Martinez
Pilar Gonz´alez · Alberto Gil-Setas · Uxua Flores
Beatriz Orden · Peña G´omez-Herruz · Rosario Millan

The aetiology of paediatric inflammatory vulvovaginitis

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Abstract Vulvovaginitis is the most common gynaecological problem in prepubertal girls and clear-cut data on the microbial aetiology of moderate to severe infections are lacking. Many microorganisms have been reported in several studies, but frequently the paediatrician does not know the pathogenic significance of an isolate reported in vaginal specimens of girls with vulvovaginitis. A multicentre study was performed, selecting 74 girls aged 2 to 12 years old with a clinical picture of vulvovaginitis and inflammatory cells on Gram stain. All the specimens were cultured following standard microbiological techniques and the paediatricians completed a questionnaire to highlight risk factors after interviewing the parents or tutors. The data were compared with those obtained in a control group of 11 girls without vulvovaginitis attending a clinic. *Streptococcus pyogenes* and *Haemophilus spp.* were isolated in 47 and 12 cases, respectively. Upper respiratory infection in the previous month ($P < 0.001$) and vulvovaginitis in the previous year ($P < 0.05$) were identified as significant risk factors. Foreign bodies, sexual abuse, poor hygiene and bad socioeconomic situation were not identified as risk factors for the infection. *Conclusion*: Paediatric inflammatory vulvovaginitis is mainly caused by pathogens of the upper respiratory tract and the most common risk factor for this infection is to have suffered an upper respiratory tract infection in the previous month.

Keywords Paediatric vulvovaginitis · *Haemophilus spp.* · *Streptococcus pyogenes*

Abbreviations *HI* *Haemophilus influenzae* · *PIV* paediatric inflammatory vulvovaginitis · *SP* *Streptococcus pyogenes*

On behalf of the Spanish Study Group for Primary Care Infection

J. Cuadros (✉) · P. Gómez-Herruz
Servicio de Microbiología y Parasitología,
Cra. de Meco s/n, Alcalá de Henares,
28805 Madrid, Spain
E-mail: jcuadros@efd.net
Fax: +34-1-8801825

A. Mazón · A. Gil-Setas
Laboratorio de Microbiología,
Ambulatorio General Solchaga,
Pamplona, Navarra, Spain

R. Martinez · B. Orden · R. Millan
Laboratorio de Microbiología,
CE Argüelles, Madrid, Spain

P. González
Servicio de Pediatría, Hospital Príncipe de
Asturias, Alcalá de Henares,
Madrid, Spain

U. Flores
Servicio de Pediatría,
Centro de Salud de Noain,
Navarra, Spain

Introduction

Vulvovaginitis is the most common gynaecological problem in prepubertal girls. Several different predisposing factors have been implicated in this disease, such as poor hygiene, sexual abuse, vaginal irritants, foreign bodies and threadworms [4, 6, 7,14]. Paediatric inflammatory vulvovaginitis (PIV), defined as a vulvovaginitis in children characterised by the presence of leukocytes in the exudate, is generally infectious and clear-cut data concerning the aetiology are needed to give therapeutic and epidemiological recommendations. Published studies on the aetiology of paediatric vulvovaginitis have described a wide array of gram-positive and gram-negative bacterial isolates [6, 7, 9, 12,14] as potential pathogens. The aim of this study was to clarify the aetiology of inflammatory vulvovaginitis using a multicentric approach and define the epidemiological and microbiological characteristics of the disease.

Subjects and methods

Three Spanish health centres participated in this multicentre study. They serve a total population of 85,604 girls under 14 years of age (from a total of 1,061,892 inhabitants, 559,533 of them women). Clinical cases were defined as girls between 2 and 12 years of age who visited either a clinic or an emergency department with symptoms of vulvovaginitis (vaginal redness and discharge and/or itching and/or dysuria). The clinical cases were included in the study if: (1) a vaginal specimen was sent to the microbiology laboratory and showed inflammatory cells on Gram stain; (2) the girl's paediatrician completed a questionnaire indicating signs and symptoms and epidemiological data; and (3) at least a Sellotape strip sample taken to rule out *Enterobius vermicularis* was also sent to the laboratory. Specimens were also obtained from a small control group of 11 girls without vulvovaginitis who attended the clinic of one centre, after obtaining informed consent of parents or tutors.

Microbiological methods

All specimens were transported in Stuart or Amies medium and processed with standard microbiological procedures [13] for Gram stain and cultures of bacterial and fungal pathogens in blood agar, chocolate agar, CNA and MacConkey, Thayer-Martin and Saboreaud-chloramphenicol agar. The cultures were incubated in air or 5%–7% CO_2, as appropriate, for at least 48 h. The Graham test was performed by pressing a Sellotape strip on the skin adjacent to the anus and then removed and stuck onto a slide which was examined for the presence of ova by microscopy.

Epidemiological methods

A questionnaire was completed by the paediatrician from data given by the parents or tutors. It was designed to identify the following possible predisposing or environmental factors leading to PIV: previous episodes of vulvovaginitis, topical treatments, antibiotic treatments, upper respiratory infections/amigdalitis, cutaneous infections, dermatitis, irritants exposition, sexual abuse, poor personal hygiene, and/or bad socioeconomic situation. Signs and symptoms, topical and antibiotic treatment and the evolution of the infection were recorded by the physician using the questionnaire.

Statistics

Predisposing and environmental factors and microbiological data were compared between the cases and the controls using the χ^2 test. Statistically significant differences were set at $P \leq 0.05$.

Results

The study lasted 20 months (between February 2001 and September 2002) and during this period the three centres processed 13,081 vaginal specimens for the diagnosis of vaginitis; of those, 1,328 were of girls up to 14 years of age (10%). In all, 319 samples showed inflammatory cells (24%). Finally, a total of 74 patients were recruited for the study. The median age was 5.8 years (7.5 years for controls) with an age range from 2 to 11 years (4 to10 years for controls), and the median time of evolution until the first visit was 7 days (interval 1–180 days). The epidemiological data were compared with those of the control patients. Previous respiratory infection ($P < 0.001$) and previous vulvovaginitis ($P < 0.05$) were identified as significant risk factors. In all, 86 microorganisms were isolated in the 74 patients and *Streptococcus pyogenes* (SP) and *Haemophilus influenzae* (HI) were detected in 47 and 12 cases, respectively (Table 1). For 11 patients, multiple isolates were cultured. Empirical treatment was mainly topical and was changed to oral therapy after receiving the culture results in 51 cases (amoxicillin 22; amoxicillin/clav. 16; others 13). The mean duration of oral treatment was 9 days. The global rate of remission was 97% (63/65).

Table 1 Microorganisms ($n = 86$) isolated from cases ($n = 74$) and controls ($n = 11$)

Microorganism	Controls	P
Streptococcus pyogenes	0	< 0.001
Haemophilus influenzae	0	
Corynebacterium spp.	2	
Staphylococcus aureus	0	
Candida albicans	0	
Gardnerella vaginalis	2	
Escherichia coli	1	
Proteus mirabilis	0	
Staphylococcus epidermidis	8	
Candida parapsilosis	0	
Streptococcus pneumoniae	0	
Streptococcus anginosus	3	
Haemophilus parainfluenzae	0	
Pseudomonas aeruginosa	1	

Discussion

Our results show that the main causative agents of PIV in our media were bacteria from the upper respiratory tract such as SP and *Haemophilus spp*. (47 and 12 cases respectively). Other authors have described the importance of these pathogens [2, 3, 6, 7, 8, 11, 12,14], but the prevalences obtained in their studies were much lower, ranging from 0% to 24% for SP. This difference can be explained by noting that we included in this current study only specimens with inflammatory cells on microscopy and our population presented moderate or severe clinical pictures. The apparent increase in diagnosed cases of vulvovaginitis and perianal disease by SP has been described recently [9, 10] and this can be connected with the increase in streptococcal pharyngitis within the community. This fact is epidemiologically important and future studies should investigate the relevance of transmission of pharyngeal strains to the genital area by autoinoculation, one of the most probable hypotheses postulated in the literature [9]. HI is not usually isolated in healthy young girls [5,8]. Although some studies have rated this bacterium as the primary cause of vulvovaginitis [14], most series present it as the second most common microorganism in infectious paediatric vulvovaginitis [2]. In countries like the United

States, France and Spain, the prevalence of beta-lactamase producing HI can be >25% [1,15], and any empirical antibiotic treatment for a probable infective vulvovaginitis must take into consideration the local rates of *Haemophilus* resistance to decide if treatment with oral amoxicilin is adequate or not [11].

Threadworms and poor hygiene have been cited as major causes of vulvovaginitis [14]. However, in our study only one patient with PIV showed oxyures and poor hygiene was not identified as a risk factor in any case. These factors can be relevant in mild, irritative vulvovaginitis, but their role in moderate to severe infective vulvovaginitis remains to be proven.

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